A Blog  
  
Many blog posts that I’ve read over the years tend to quickly narrow their audience in the opening paragraphs. While this has its benefits, I’d like to try and find a balance. I want to keep my posts informative for the technically inclined while still giving new comers a chance to learn.   
Feel free to email me with any topics that you’d like to be discussed. I’m keen to answer any questions, and hear all thoughts/opinions.   
  
Hosting Your Personal Website at Home

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Intro

I’ve seen plenty of online portfolios. Especially from undergraduates studying Computer Science. To create my own, I embarked on a slightly more unconventional approach (in 2017 that is).   
  
The Raspberry Pi, an affordable, credit card sized computer was the instrument of choice. I’d bought one during university and it was just gathering dust. In an attempt save it from neglect, I used it to host this personal website.

Although the project was small and took less than a day in total (spent a few hours here and there when I found the time). It was an educational one.

Information consumed at university is often not given appropriate context.   
Depending on the module taken, you may find that much of the examinable material is theoretical. While this is beneficial for many reasons, it tends to commonly raises barriers when one tries to apply their newfound knowledge in a practical setting.

The main goal of this side project was to solidify familiar concepts by building something of interest.

Equipment:  
- MacBook Pro 2.4GHz Intel Core i5 16GB RAM - macOS Sierra  
- Raspberry Pi Model B 3

- TalkTalk HUAWEI HG633  
- 32GB MicroSD Card/Reader

- Micro USB cable   
- Ethernet Cable

The Details

In the interest of brevity, the focus of this post will be mainly on the lesser known concepts that you’re likely to encounter. However, I’ll still provide enough detail so that you could try the same at home. It’s also worth mentioning, my intention is not to explain in depth how these technologies work, but to instead give the reader a working knowledge to allow them to understand why and how things are done this way.   
  
1. Purchase a Domain Name  
Evidently, I bought the domain ‘blainemalone.com’. It cost £14.89 from ‘godaddy.com’. I’d advise that you do this at the end of the project if you are unsure that you’ll see it through (in the meantime use the routers IP address to test if website is live). Also, there are other domain registrars. Price around to find the best offers for you. With this said, I did appreciate GoDaddy’s intuitive DNS management dashboard and troubleshooting forums.   
  
2. Set up Raspberry Pi  
Insert your Micro SD card into the reader and then into your laptop/desktop computer. Now we want to download the Raspbian OS from here <https://www.raspberrypi.org/downloads/raspbian/> (select minimal image, only using Pi as a webserver. As a result, we don’t really require a GUI).   
Once downloaded, I used Etcher to burn the .img file to the SD card https://etcher.io/. For more information on how to do this, see <https://www.raspberrypi.org/documentation/installation/installing-images/README.md>.

After you completed this successfully, insert the SD card into the Raspberry Pi, connect the Micro USB for power and attach the Ethernet cable to both the Pi and the router.

Once you have setup your Pi, you’ll want to know its IP address. In short, we want to be able to consistently locate our Pi in the local network.   
The best way to do this is to take advantage of the DHCP (Dynamic Host Configuration Protocol) Server built into your router. In short, DHCP helps with the allocation of IP addresses within a network. It removes the tedious process of manually configuring each machine which can be error-prone. As a brief reminder, every computer once it boots up, has a link layer address (MAC) embedded into their NIC (Network Interface Card). At this point it will not have an IP address so it must send a DHCP DISCOVER packet to the DHCP Server (Could be in same device as router or on a different network). In reply, the DHCP Server will allocate any one of its free IP addresses to the request using a DHCP OFFER packet. To be able to easily communicate with our Pi, we will want to ensure that the device is given a static IP address, i.e. one which doesn’t change, regardless of the device rebooting or loosing connection.

To achieve this using the TalkTalk HUAWEI HG633 router, I logged into the admin portal at <http://192.168.1.1/>. Under ‘Home Network’>’LAN Interface’>’DHCP Reservation’. This allowed me to map the Pi’s MAC address to an available IP address. So, anytime the DHCP Server receives a DHCP DISCOVER packet from the Pi’s MAC address it will provision the same IP address to it every time (e.g. 192.168.1.222). This task is generally router specific, so you should spend a little time getting used to your setup.

You can find out more about DHCP here.  
  
Usually you’ll want your personal website to be public facing, allowing anyone to access it. To do this, you’ll need to configure a DMZ (Demilitarised Zone). If a  
malicious party gains access to your server, he/she should be isolated in the DMZ network and not have direct access to the private hosts. For example, your database server could be sitting inside the private network and not in the DMZ. For home routers, when enabling a DMZ containing a device, you must ensure that it’ll have a static IP. Otherwise a different device may inherit the designated IP address and become the DMZ host instead (not cool).  
  
To achieve this using the TalkTalk HUAWEI HG633 router  
For devices that don't work correctly with the firewall in place (such as network gaming), we recommend you make use of the Port Forwarding functionality.  
LOOKS LIKE THE PI NEEDS TO BE IN DMZ TO BE ACCESSED BY PUBLIC… PORT FORWARDING NOT ENOUGH, FIREWALL MUST BLOCK CONNECTIONS.  
  
ON SECOND INSPECTION PORT FORWARDING WORKING WHEN USING <http://88.107.96.153:8888> . CAN I SAY 80 > 80 AND REMOVE PI FROM DMZ?   
WILL THAT WORK?   
 all it is doing is keeping all other devices behind the firewall but moving your selected device out.

After DMZ is enabled, the computer that is configured as a DMZ host is exposed to the Internet. For example, when building a server, you can configure the computer providing external services as a DMZ host, which helps protect other computers on the home network.

Setup static internal ip via DHCP – router specific.  
  
Then we want to use SSH – encrypted command line interface to linux computer.  
Tera Term for Windows   
Just use ssh command with mac

What you can expect to encounter:  
- Purchasing a domain name  
- Managing DNS configuration  
- Configuring your home network router \*\*  
- SFTP & SSH  
- NAT, PAT  
- DDNS  
- Containerization

- Web servers  
- JavaScript  
- ARP Address resolution protocol   
  
  
   
\*\* Note: Please be careful when configuring your router at home. Make sure you understand the implications of what you are doing, otherwise you could leave your home network vulnerable. I’ve highlighted some of the obvious vulnerabilities. Please remember, even in the best case, your setup will only ever be as secure as the least secure portion of whatever is accessible over the Internet.